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MANAGEMENT REPORT

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Estimation of seasonal dynamics of arid and semi-arid zone pasture productivity in the Mongolian Gobi using NOAA/AVHRR data

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Preface

This delayed management report summarizes the period from April 2002 through March 2003. The delay is a result of a health problem of the Israeli PI (Eilon Adar), combined with a failure to nominate an additional active partner who is able and willing to join the project. We are glad to inform that Dr. Lea Orlovsky has agreed to join us as an active researcher after reviewing the project proposal and the temporary findings. Most of the research activities in the four selected steppes were successfully performed. Results have been processed and currently correlated to the RS images.

1) Scientific Summary

During the first phase (until May 2002) we ran simulations with available historical data and arranged for the prolonged field expeditions. Preliminary comparative analysis of biomass and vegetation health indices was performed using historical data (1985-1997) at Tumentsogt Research Station located in eastern Mongolia, 50 km from the capital. The goal of the comparison was to investigate the potential of AVHRR data in the environment of Mongolia and to optimize biomass observational techniques in other ecosystems. Results of the historical data (1985-1997) were summarized in a paper entitled "Derivation of Pasture Biomass in Mongolia from AVHRR-based Vegetation Health Indices".

The field activity season began in June and lasted until October 2002. Most of the planned research activities for the first summer season have been accomplished as originally expected.

During the first field-research season research activities were performed in three research sites: Bulgan (desert steppe), Bayanunjuul (dry steppe), and Tumentsogt (typical steppe), where soil moisture and vegetation parameters such as species composition, fractional vegetation cover and yield (phenology) were collected.

- During this year, we compared biomass anomaly with vegetation health index (VT) estimates at Tumentsogt research site.
- Preliminary results confirm the basic hypothesis, and increase the likelihood that major goals in developing operational techniques for assessment of biomass production from operational environmental satellites will be achieved by the end of the project.

2) Scientific Issues: Revision of research activities

Electronic Data Transmission

Most of the digital data was transmitted toward the end of the sampling season. Radio transmission from the remote steppes faced many local difficulties associated with bad communication, file size and transmission format. Until today, most of the digital photos

of the vegetation profiles are readable but not in digital format. We hope to resolve this issue in the very near future. Unless we obtain the appropriate digital format, the statistical vegetation density and elevation will be performed on re-scanned photo images.

Ground-truth measurements

Ground-truth measurements of *vegetation species, density, height soil moisture, ground temperature and vegetation stress* have been performed during the growing season from June 1 to the end of September 2002 at three research sites, situated in different natural zones: typical steppe (Tumentsogt, N 47°40'52" E 112°23'916", H: 1000 m) dry steppe (Bayanunjuul, N 46°49'794'', E 105° 46'583'', H:1369 m) and desert steppe (Bulgan, N 44°00'46'', E 103° 33'34'', H:1442 m). In addition to biomass, *fractional vegetation canopy* was measured. Soil moisture was measured at 5 levels: surface 0-1 cm and subsurface 10-20 cm, 20-30 cm, 30-40 cm, and 40-50 cm.

Intensive summer activities

The semi-arid climate of Mongolia imposes a very intensive and fast botanical evolution of vegetation growth and development during the growing season. Warm and wet weather in the second half of summer (from mid-July) changes the rate of vegetation growth dramatically. In addition, grazing effects should be taken into consideration. Thus, we concluded that weekly monitoring of both ground- and satellite-based vegetation parameters from June through September (4 months) will be sufficient for achieving the goals of this project.

Electronic data collection of the dynamic development of vegetation

During the coming season (2003) we plan to continue with field observations at four research sites. The growing season vegetation dynamics will be monitored electronically in order to provide fast and reliable information to the IOB headquarters in Ulaan Baatar, and later to BGU. This will also guarantee unified botanical information from all research sites, avoiding human interference. We are looking for better communication alternatives that will allow digital data transmission to BGU and NOAA. Following almost real-time photo and image processing, the electronic images will be double checked by manual sampling of vegetation and also measurements of the total biomass and the biomass for the five main plant species.

3) Managerial Issues

Budgetary concerns

1. Activities in Israel

Due to prolonged health problems of the Israeli PI (Eilon Adar), which forced him to undergo a slow recovery, the budget in Israel was frozen, following the limited research activities in Israel.

However, our colleagues in Mongolia performed the planned tasks and reached the original objectives (targets) in three out of the four steppe stations. Therefore, in an international phone-meeting we all agreed to proceed with the original plans with minor

revisions, and provide our Mongolian colleagues with the already promised resources. As Dr. Orlovsky joins the project and the expected student from Mongolia is due to start soon, the scientific activities in Israel will be resumed.

2. *Equipment for the Mongolian partners*

A list of approved equipment and approximated budget for the Institute of Botany, Mongolian Academy of Sciences is presented in Table I below. Table II presents the actual items that were purchased including the actual cost in US\$ as provided by the Mongolian partners.

Table I Approved research equipment	Cost in US\$
Portable PC (for preliminary data acquisition and as data logger for the electronic camera and initial data processing)	2500.0
Power generator	800.0
Digital camera	1200.0
Tripod (as a stand for the camera)	150.0
Mobile phones	650.0
Estimated total cost of scientific equipment (for each set):	<u>5300.0</u>
Subtotal for three sets:	<u>15,900.0</u>

Two sets of research equipment and camping gear for the two remote stations:

	Cost in
US\$	
Camping gear: tent, cooking facilities (stove), sleeping bags, portable beds, water container, kitchen set (utensils), lights	1550.0
Trailer, accessories and spare parts	2000.0
Estimated total cost for the additional equipment dedicated for the remote stations only:	<u>3550.0</u>
Subtotal for two sets:	<u>7100.0</u>

One set of equipment for the headquarters (Institute of Botany):	Cost in US\$
Desktop PC: 1 GH, 256 RAM, 30 GB HD, CD (x32), 1.44 Drive, ZIP Drive)	3500.0
CD Writer	600.0
Laser Printer (B&W)	1250.0
Color printer (Ink Jet)	1000.0
Scanner (color)	900.0
Software: Office, Graphics etc.	1250.0
Facsimile	700.0
GPS	900.0
Subtotal:	10100.0

Equipment for the Israeli partner (to be used also by the Mongolian trainees):

Cost in US\$

Desktop PC: 1 GH, 256 RAM, 30 GB HD, CD (x32), 1.44 Drive, ZIP Drive) 3500.0

Total expected cost of research equipment: US\$36600.0

Table II Reported expenses for scientific equipment purchased by the Institute of Botany, Mongolian Academy of Sciences

Item	Estimated price (US \$)	Units	Note	Actual price and number (US\$)
Portable PC (for preliminary data acquisition and as data logger for the electronic camera and initial data processing)	2,500	3	Purchased	4980 for 2
Power generator	800	3	Purchased	1,200 for 2
Digital camera (prolink)	1200	3	Purchased	125 for 1
Digital camera a20			Purchased	1467 for 2
Tripod	150	3		
Mobile phones	650	3	Purchased	1200 for 3
Camping gear	1550	2	Purchased	454
Trailer	2,000	2		
Desktop	3500	1	Purchased	1649
CD writer	600	1		
Laser printer	1250	1	Purchased	430
Color printer	1000	1	Purchased	385
Scanner (color)	900	1	Purchased	585
Software	1250			
Facsimile	700	1	Purchased	463

GPS	900	1	Purchased	270
Canon cartridges		1	Purchased	14 for 1
Electronic scales		1	Purchased	850 for 1
Flash card		2	Purchased	70 for 2

Total actual expenses for equipment during year I is: —
14,142.0

Staff changes

Dr. Lea Orlovsky was invited to join the project as additional principal investigator from the Israeli side and as academic advisor for the student who will soon be arriving from Mongolia.

Timetable changes

Due to the above-mentioned difficulties, health problems and administrative changes, the AID is requested to prolong the project without additional budget until the new termination date for the project of 30th of December 2004.

4) Special Concerns

Scientific services

NOAA (Dr. Felix Kogan) will provide retrieval of VCI from NOAA data and Dr. Eilon Adar will help in comparison with ancillary and remotely sensed data. This was and still is the key issue for this advanced research program.

5) Collaboration, Travel, Training and Publications

Training

Due to the political and military situation in the Middle East, training of Mongolian researchers has not yet been accomplished. We all seek for a better situation in the near future, which will allow the exchange of scientific staff.

A Mongolian student is expected soon in Israel. If for any reason we shall not have a Mongolian student as originally planned, an Israeli research assistant will be recruited.

Travel and visits

Due to the political and military situation in the Middle East, the planned research activities of all researchers in Israel such as integrated data analysis were postponed. The field-activities of the Israeli researcher in Mongolia were canceled due to health interference as already mentioned above.

We are planning to participate in the first phase of the field surveys in Mongolia at the beginning of the coming observation season. A meeting of researchers in Ulan-Battar is expected at the beginning of June 2003.

Anticipated activities

Field data collection in four research sites in Mongolia began in June 2002. New relevant AVHRR data provided by NOAA for these environments will be used to optimize the estimation of biomass production. Ground truth measurements will then begin on June 1st 2003. During this year, we shall compare biomass anomaly with vegetation health (VT) in the four research stations, exploring the fitting of satellite-based estimates of wet/dry/normal with ground classification and the trend of the RS parameters during the growing season.

Anticipated Travel

- *Domestic travel* – As originally planned, a monthly visit of the Mongolian research leaders of the field research technicians to Steppes Undjuul (typical steppe and Partizan (forest steppe) will take place. One midterm visit to the Tumentsogt (steppe zone) is expected in Mid- August.
- *International travel mission* - The research leaders will meet their colleagues in Ulan-Battar in 2 of the Mongolian steppes during this summer to work on-site with the Mongolian research team. The mission aims to apply the already achieved RS indices (See Annual Report 1) to local data to investigate the application of the proposed scientific procedures and, if necessary, to suggest alternative methods to be implemented already this season.

6) Requests to American Embassy Tel Aviv or A.I.D.

Actions: We are looking for formal approval of Dr. Lea Orlovsky as an additional PI in this project.